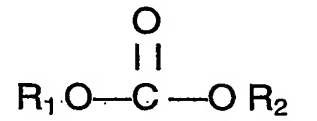
CLAIMS

1. Use of a dialkyl carbonate, or a blend of dialkyl carbonates, having the general formula (I):



(I)

wherein $R_1$ and $R_2$, the same or different, have the following meaning:

- $R_1$, $R_2$ represent linear, branched or cyclic alkyl radicals, containing from 1 to 12 carbon atoms, and the sum of the carbon atoms of $R_1$ and $R_2$ is between 2 and 15,

as solvents for expanded polystyrene.

2. The use of a dialkyl carbonate, or a blend of dialkyl carbonates, according to claim 1, wherein:

- $R_1$, $R_2$ represent linear or branched alkyl radicals, containing from 1 to 8 carbon atoms, and the sum of the carbon atoms of $R_1$ and $R_2$ is between 5 and 10.

3. The use of a dialkyl carbonate, or a blend of dialkyl carbonates, according to claim 2, wherein the dialkyl carbonates are selected from those having a flash point higher than 55°C.

4. The use of dialkyl carbonate, or a blend of dialkyl carbonates, according to claim 3, wherein the dialkyl carbonates are selected from the group consisting of di-n-butyl carbonate, di-isobutyl carbonate, di-n-

propyl carbonate.

5. A process for recycling expanded polystyrene comprising:

(a) volume reduction of expanded polystyrene by dissolution with a dialkyl carbonate, or a blend of dialkyl carbonates having formula (I);

(b) removal of the insoluble components;

(c) selective precipitation of polystyrene with a non-solvent or a blend of non-solvents for polystyrene;

(d) separation, drying and extrusion of the precipitated polystyrene.

6. The process for recycling expanded polystyrene according to claim 5, wherein, in step (a), the concentration of polystyrene in the solution is between 5 and 50% weight and the dissolution of the expanded polystyrene with dialkyl carbonate is carried out at atmospheric pressure, at a temperature ranging from 20 to 70°C.

7. The process for recycling expanded polystyrene according to claim 6, wherein the concentration of polystyrene in the solution ranges from 15 to 40% by weight.

8. The process for recycling expanded polystyrene according to claim 6, wherein the dissolution of expanded polystyrene with dialkyl carbonate is effected in an

apparatus equipped with a stirring system and at room temperature.

9. The process for recycling expanded polystyrene according to claim 5, wherein the selective precipitation of polystyrene in step (c) is effected by feeding the styrene solution to the non-solvent, or blend of non-solvents, maintained under turbulent stirring, onto the bottom of the precipitation reactor, below the stirring system.

10. The process for recycling expanded polystyrene according to claim 5, wherein the selective precipitation of polystyrene in step (c) is effected with a non-solvent, selected from the group consisting of glycols, alcohols, alkylene carbonates, dialkyl carbonates with a number of carbon atoms equal to or higher than 17, alkyl esters of fatty acids.

11. The process for recycling expanded polystyrene according to claim 5, wherein the quantity of non-solvent, or blend of non-solvents, used for selectively precipitating the expanded polystyrene in step (c) is in a weight ratio with the dialkyl carbonate of between 2:1 and 20:1.

12. The process for recycling expanded polystyrene according to claim 11, wherein the quantity of non-solvent, or blend of non-solvents, used is in a weight ratio

with the dialkyl carbonate of between 3:1 and 15:1.

13. The process for recycling expanded polystyrene according to claim 5, wherein the selective precipitation of polystyrene in step (c) is effected at a temperature ranging from 10 to 70°C.

14. The process for recycling expanded polystyrene according to claim 13, wherein the selective precipitation is effected at a temperature ranging from 15°C to 60°C.

15. The process for recycling expanded polystyrene according to claim 9, wherein the selective precipitation of polystyrene is effected by feeding the polystyrene solution to the non-solvent onto the bottom of the precipitation reactor, with a flow rate, expressed as g/(hour*liter of non-solvent), within the range of 30-1500.

16. The process for recycling expanded polystyrene according to claim 15, wherein the solution of polystyrene is fed to the non-solvent with a flow rate, expressed as g/(hour*liter of non-solvent), within the range of 50-800.

17. The process for recycling expanded polystyrene according to claim 5, wherein the separation of polystyrene precipitated in step (d) is effected by filtration, decanting, centrifugation, at a temperature ranging

from 10°C to 70°C.

18. The process for recycling expanded polystyrene according to claim 17, wherein the separation of the precipitated polystyrene is effected at a temperature within the range of 15°C - 60°C

19. The process for recycling expanded polystyrene according to claim 5, wherein the drying of the polystyrene precipitated in step (d) is effected at a temperature ranging from 50°C to 180°C and a pressure of between 760 and 1 mm Hg.

20. The process for recycling expanded polystyrene according to claim 19, wherein the drying is effected at a temperature ranging from 80°C to 150°C and a pressure of between 500 and 10 mm Hg.